

# DIGITAL REFERENCE<sup>®</sup>

## DR-1000 Series Professional VHF Wireless Systems

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**DR-1500** UniPak<sup>™</sup> Transmitter System

**DR-1600** Handheld Dynamic Microphone System

***Installation and Operation***

# Professional VHF Wireless Systems

## *Installation and Operation*

This device complies with part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.

This device complies with INDUSTRY CANADA R.S.S. 210, en conformité avec IC: RSS-210/CNR210. Operation is subject to the following conditions: 1) This device may not cause harmful interference and 2) this device must accept any interference received, including interference which may cause undesired operation. Changes or modifications not expressly approved by Audio-Technica could void your authority to operate this equipment.

**CAUTION!** Electrical shock can result from removal of the receiver cover. Refer servicing to qualified service personnel. No user-serviceable parts inside. Do not expose to rain or moisture.

The circuits inside the receiver and transmitter have been precisely adjusted for optimum performance and compliance with federal regulations. Do not attempt to open the receiver or transmitter. To do so will void the warranty, and may cause improper operation.

### **Notice to individuals *with implanted cardiac pacemakers or AICD devices:***

Any source of RF (radio frequency) energy *may* interfere with normal functioning of the implanted device. All wireless microphones have low-power transmitters (less than 0.05 watts output) which are unlikely to cause difficulty, especially if they are at least a few inches away. However, since a "body-pack" mic transmitter typically is placed against the body, we suggest attaching it at the belt, rather than in a shirt pocket where it may be immediately adjacent to the medical device. Note also that *any medical-device disruption will cease when the RF transmitting source is turned off*. Please contact your physician or medical-device provider if you have any questions, or experience any problems with the use of this or any other RF equipment.

### ***Introduction***

Thank you for choosing an Audio-Technica professional wireless system. You have joined thousands of other satisfied customers who have chosen our products because of their quality, performance and reliability. This wireless microphone system is the successful result of years of design and manufacturing experience.

Each DR-1000 Series professional VHF wireless system includes a receiver and either a body-pack transmitter or a handheld microphone/transmitter on a specific crystal-controlled frequency.

Because DR-1000 Series packaging is designed to hold all versions of the system, some compartments in the carton are intentionally left empty.

The DR-R11 receiver includes a space-saving switching power supply that automatically adapts to changes in mains voltage. Unlike bulky linear power supplies, this switching power supply is lightweight and compact; it uses only a single outlet space.

The versatile DR-T15 UniPak™ body-pack transmitter has both a high-impedance input for instruments, and a low-impedance input with bias connection for use with dynamic and electret condenser microphones. The DR-T16 handheld transmitter features a unidirectional dynamic microphone element.

Both the body-pack and handheld transmitters use internal 9-volt batteries and have Off/Standby/On switches, input Trim (level) adjustments and battery-save switches.

## Receiver Installation

### Location

For best operation the receiver should be at least 3' (1 m) above the ground and at least 3' (1 m) away from a wall or metal surface to minimize reflections. Keep the receiver antennas away from noise sources such as digital equipment, motors, automobiles and neon lights, as well as away from large metal objects. In multi-channel systems, position receivers at least 3' (1 m) apart and keep operating transmitters at least 6' (2 m) from the receivers to help assure maximum RF performance.

### Output Connection

The receiver provides unbalanced, aux-level output from a 1/4" TS ("mono") phone jack; an output cable is not included. Use a shielded audio cable with 1/4" phone plug to connect the receiver's AF Out jack to the mixer/amplifier's aux-level input.

### Power Connection

Connect the DC plug on the included AC power adapter to the DC power input on the back of the receiver. Secure the cord over the cord hook on the back of the receiver, to keep the plug from being detached by an accidental tug on the cord. Then plug the adapter into a standard 120 Volt 60 Hz AC power outlet.

(Note that the receiver has no power Off/On switch. The receiver will be energized whenever the power adapter is connected and plugged into the AC outlet. Unplug the power supply from the AC outlet when the system is not in use – both for safety, and to conserve energy.)

### Antennas

A novel "dipole" antenna system on the receiver improves operation by providing a "ground" element in addition to the usual "signal" element. Position the two antennas at 90° in the form of a "V," or position the left ("signal") antenna vertically and the right ("ground") antenna horizontally, in the shape of an "L" (Fig. A). Use the position that performs better in your operating environment. Be certain to extend both antennas to their full 15" (38 cm) length by holding them at their bases and pulling out on their caps. Both antenna elements may be swiveled to the left and right, but do not attempt to rotate them in a screwing/unscrewing motion. To do so may damage the antenna and/or receiver. For best performance, locate the receiver so its antennas are in direct line-of-sight to the transmitter's likely operating position.

## Receiver Controls and Functions

### Front Panel Controls and Functions (Fig. B)

1. ANTENNAS: Position the "signal" antenna (1a) and "ground" antenna (1b) as shown in Figure A.
2. POWER INDICATOR: Lights when power is supplied to the receiver.
3. RF INDICATOR: Lights to show presence of transmitter signal.
4. AF PEAK INDICATOR: Only lights when audio distortion is present at maximum modulation. Not affected by position of Volume control.

### Rear Panel Controls and Functions (Fig. C)

5. AUDIO OUTPUT JACK: 1/4" TS (Tip-Sleeve) or "mono" phone jack. Use a shielded cable to connect to an unbalanced aux-level input of a mixer or amplifier.
6. VOLUME CONTROL: Adjusts the audio level at the 1/4" output jack. Does not affect AF Peak indicator.
7. CORD HOOK: Loop the cord around the cord hook to keep the DC plug from pulling out accidentally.
8. POWER INPUT JACK: Connect the DC plug from the included AC adapter.

### Battery Selection and Installation

An alkaline 9-volt battery is recommended. ***Make certain the transmitter power switch is Off before installing or changing batteries.***

When inserting the battery, ***observe correct polarity as marked inside the battery compartment.*** The transmitter housings are designed to prevent incorrect installation of the battery; ***do not force the battery in.*** Reversed batteries may cause damage to the transmitter.

### UniPak™ Transmitter Battery Installation

1. Slide off the battery cover as shown in Figure D.
2. Carefully insert a fresh 9V alkaline battery, observing polarity markings.
3. Replace the battery cover (Fig. E).

### Handheld Transmitter Battery Installation

1. While holding the upper part of the transmitter body just below the ball-screen, unscrew the lower body cover and slide it downward to expose the battery compartment (Fig. F). ***Do not attempt to pull the lower body farther down, or to gain access to the electronics.***
2. Lift the white “battery keeper” arm until it sticks straight out from the mic body (no higher). Then carefully insert a fresh 9V alkaline battery, observing polarity markings.
3. Screw the body back together. ***Do not overtighten.***

### Battery Condition Indicator

The red battery condition indicator (Fig. H/I) should light strongly with a fresh battery. As the battery weakens, the indicator will grow dimmer. When the indicator becomes very dim or goes out, there is little life left in the battery. Replace it at once for continued operation of the transmitter.

All transmitters feature battery-save switches (Fig. D/F). As supplied, the switch is set in the High position for maximum range. Switching to the Low position increases battery life by reducing power. (Note: Effective range decreases when the switch is set in Low position.)

### UniPak™ Transmitter Input Connection

Connect an audio input device (microphone or guitar cable) to the input connector on the bottom of the transmitter. The cable connector latches automatically when inserted into the transmitter jack. To unlatch and remove the connector, simply pull up on the connector’s knurled metal collar.

A number of Audio-Technica professional microphones and cables are available separately, pre-terminated with a UniPak™ input connector (see “Optional System Accessories” on page 7).

### Transmitting Antenna

The UniPak™ transmitter includes a permanently attached flexible antenna. For best results, allow the antenna to hang freely and full length from the bottom of the transmitter. If the received signal is marginal, experiment with different transmitter positions on your body or instrument; or try repositioning the receiver. ***Do not attempt to remove, replace or change the length of the transmitting antenna.***

## System Operation

Turn down the receiver volume control and the mixer/amplifier level before starting up the wireless system. Do **not** switch on the transmitter yet.

### Receiver on...

Plug the power supply into an AC power source. The green Power indicator on the front panel will light.

### Transmitter on...

When the transmitter is switched on, the receiver's yellow RF signal indicator will light. The transmitters have a 3-position power switch. When the switch is set to "Standby" (ST or ST.BY), the transmitter produces RF with no audio signal. When the switch is "On," the transmitter produces both RF and audio. Excessive audio input to the transmitter will cause the receiver's red AF Peak indicator to light.

### Receiver Volume

Under typical operating conditions, the receiver's volume control should be turned all the way up, with overall system audio gain adjusted at the mixer or amplifier.

### Input Level Adjustment

Input trimmer controls in the transmitters enable you to maximize performance for a particular microphone or guitar sensitivity, or to adjust for different acoustic input levels.

### Adjusting Input Level - UniPak™ Transmitter

Slide the battery cover off the top part of transmitter and remove the screwdriver from its clip (Fig. D). Gently turn both the "MT" (Mic Trimmer) and "GT" (Guitar Trimmer) controls to their full counterclockwise positions (toward "LO").

#### • Microphone: Adjusting input level

Gently turn only the "MT" (Mic Trimmer) control all the way **up** (clockwise, toward "Hi"). Check for excessive gain by speaking/singing into the microphone at typically loud levels while watching the receiver's AF Peak indicator. If the AF Peak indicator does light, turn the MT control slightly counterclockwise until the AF Peak indicator no longer lights with maximum audio input to the transmitter.

#### • Guitar/Instrument: Adjusting input level

Gently turn only the "GT" (Guitar Trimmer) control all the way **up** (clockwise, toward "Hi"). Check for excessive gain by playing at typically loud levels while watching the receiver's AF Peak indicator. If the AF Peak indicator does light, turn the GT control slightly counterclockwise until the AF Peak indicator no longer lights with maximum instrument input to the transmitter.

After adjusting input level, return the screwdriver to its clip and reinstall the battery cover. No further transmitter gain adjustments should be needed, as long as the input device and the acoustic input level are not changed.

### Adjusting Input Level - Handheld Transmitter

Unscrew the lower body cover and slide it downward, exposing the screwdriver and Gain Trimmer control (Fig. G). Remove the screwdriver from its clip. Gently turn the control to its full clockwise position (toward the side marked "H"), the factory setting. Check for excessive gain by speaking/singing into the microphone at typically-loud levels while watching the receiver's AF Peak indicator. If the AF Peak indicator does light, turn the Gain Trimmer control slightly counterclockwise until the AF Peak indicator no longer lights with maximum audio input to the mic/transmitter.

Return the screwdriver to its clip and close and secure the lower body. No further transmitter gain adjustments should be needed, as long as the acoustic input does not change significantly.

**CAUTION!** *The small trimmer controls are **delicate**; use only the supplied screwdriver. Do **not** force the trimmers beyond their normal 190° range of rotation.*

*Return the screwdriver to its storage clip when not in use.*

## Ten Tips To Obtain The Best Results

1. Use only fresh alkaline batteries. Do not use "general purpose" (carbon-zinc) batteries.
2. Position the receiver so that it has the fewest possible obstructions between it and the normal location of the transmitter. Line-of-sight is best.
3. The transmitter and the receiver should be as close together as conveniently possible, but not less than 6' (2 m).
4. Do not place the receiver antennas within 3' (1 m) of another receiver or antenna.
5. The receiver antennas should be kept away from any metal.
6. A receiver cannot receive signals from two transmitters at the same time.
7. In the UniPak™ transmitter, the "MT" or "GT" input control **not** in use should be set to **minimum**.
8. If the receiver output is set too low, the overall signal-to-noise ratio of the system may be reduced. Conversely, if the volume control of the receiver is set too high, it may over-drive the input of the mixer/amplifier, causing distortion. Adjust the output level of the receiver so the highest sound pressure level going into the microphone (or the loudest instrument playing level) causes no input overload in the mixer, and yet permits the mixer level controls to operate in their "normal" range (not set too high or too low). This provides the optimum signal-to-noise for the entire system.
9. Turn the transmitter off when not in use. Remove the battery if the transmitter is not to be used for a period of time.
10. Unplug the receiver from the AC outlet when the system is not in use.

## System Operating Frequencies

### Frequency Selection

Each transmitter/receiver system operates on a single factory aligned, crystal-controlled frequency. Available frequencies are shown in the chart below.

Operating frequency is specified by a two character code, such as "T2," in addition to the actual frequency in MHz. The frequency of each transmitter appears on a label on the outside of the unit. The frequency of each receiver appears on a label on the rear panel of the unit and the frequency of each system appears on the outer carton. For future reference, please record them in the space provided below.

### RF Interference

Please note that wireless frequencies are shared with other radio services. According to Federal Communications Commission regulations, "Wireless microphone operations are unprotected from interference from other licensed operations within the band. If any interference is received by any Government or non-Government operation, the wireless microphone must cease operation..."

If you need assistance with operation or frequency selection, please contact your dealer or the A-T professional division.

Extensive wireless information also is available on the A-T Web site at [www.audio-technica.com](http://www.audio-technica.com).

Application	Freq. Code	Freq. (MHz)
<ul style="list-style-type: none"> <li>Traveling frequencies: (Normally work anywhere in the U.S.A. and Canada.)</li> </ul>	T2	169.505
	T3	170.245
	T8	171.905
Systems on these frequencies may be combined for up to three simultaneous operating channels.		

For future reference, please record your system information here (the serial numbers appear near the screwdriver clip in each transmitter, and on the bottom of each receiver):

#### Operating Frequency

Freq. Code    —    —    —

Frequency   —   —   —   •   —   —   —   MHz

#### Receiver

Model DR-R11

Serial Number   —   —   —   —   —   —   —

#### Transmitter

Model DR-T1   —   —   —  
5/6

Serial Number   —   —   —   —   —   —   —

## Specifications<sup>†</sup>

### OVERALL SYSTEM

Operating Frequency	VHF high band, 169 MHz to 172 MHz
Frequency Stability	±0.005%
Modulation Mode	FM
Maximum Deviation	±15 kHz
Operating Range	200' typical
Operating Temperature Range	40° F (4° C) to 110° F (43° C)
Frequency Response	80 Hz to 13 kHz

### RECEIVER

Receiving System	Non-diversity, single-channel, dual antenna system
Image Rejection	50 dB minimum
Signal-to-noise Ratio	80 dB at 10 kHz deviation (IEC-weighted), maximum modulation 15 kHz
Total Harmonic Distortion	≤1% (10 kHz deviation at 1 kHz)
Sensitivity	20 dBµV for 60 dB S/N (IEC-weighted)
Audio Output	350 mV (1 kHz modulation, 10 kHz deviation, 100k ohm load)
Output Connector	1/4" TS ("mono") phone jack
Power Supply	100-240V AC (50/60 Hz) to 12V DC 1A (center positive) switched mode external power supply
Dimensions	7.48" (190.0 mm) W x 1.65" (42.0 mm) H x 5.12" (130.0 mm) D
Net Weight	11.0 oz (311 grams)
Accessory Included	Power supply

### UNIPAK™ TRANSMITTER

RF Power Output	High: 10 mW; Low: 2 mW, typical
Spurious Emissions	Under Federal Regulations
Dynamic Range	≥90 dB, A-weighted
Input Connections	High impedance, low impedance, bias
Battery (not included)	9V (NEDA type 1604) alkaline
Current Consumption	30 mA typical
Battery Life	Approximately 15 hours (High); 20 hours (Low), depending on battery type and use pattern
Dimensions	2.56" (65.0 mm) W x 4.33" (110.0 mm) H x 1.00" (25.4 mm) D
Net Weight (without battery)	2.8 oz (78 grams)

### HANDHELD TRANSMITTER

RF Power Output	High: 10 mW; Low: 2 mW, typical
Spurious Emissions	Under Federal Regulations
Dynamic Range	≥90 dB, A-weighted
Microphone Element	Dynamic unidirectional
Battery (not included)	9V (NEDA type 1604) alkaline
Current Consumption	30 mA typical
Battery Life	Approximately 15 hours (High); 20 hours (Low), depending on battery type and use pattern
Dimensions	9.50" (241.3 mm) long, 2.10" (53.3 mm) maximum diameter
Net Weight (without battery)	12.7 oz (360 grams)
Accessory Included	AT8456a Quiet-Flex™ stand clamp

<sup>†</sup> In the interest of standards development, A.T.U.S. offers full details on its test methods to other industry professionals on request.

## Optional System Accessories

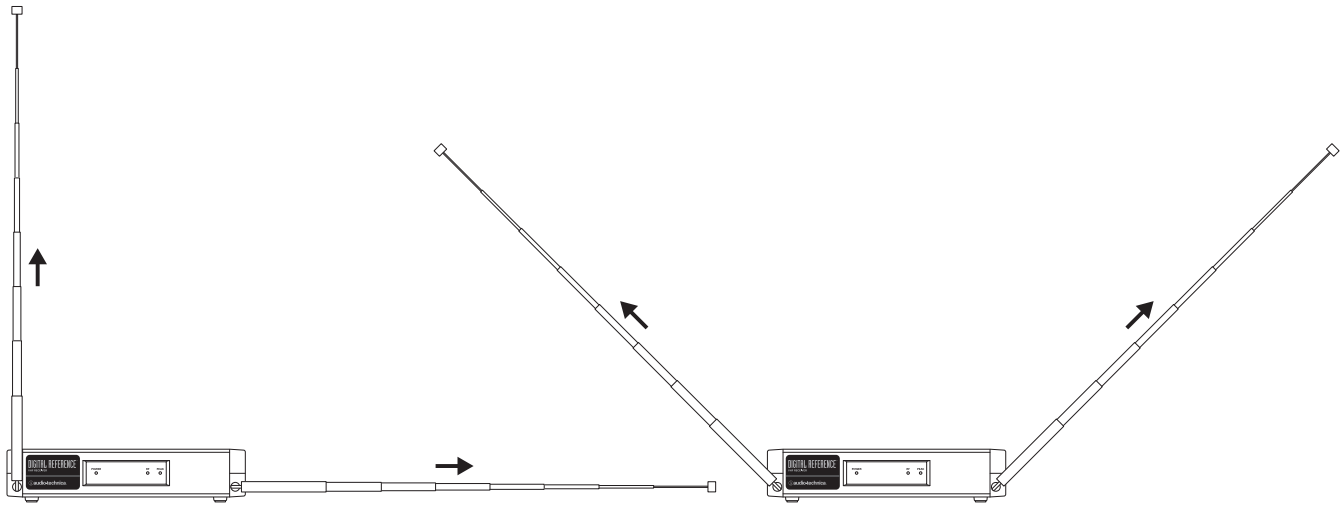
### WIRELESS MICROPHONES

DR-8HW	Headworn hypercardioid dynamic microphone terminated for use with the UniPak™ transmitter.
DR-LW	Miniature cardioid condenser lavalier/clip-on microphone terminated for use with UniPak™ transmitter.
DR-GCW	Guitar output cable with 1/4" phone plug to locking connector for use between guitar and UniPak™ transmitter. 38" long.

### OTHER ACCESSORIES

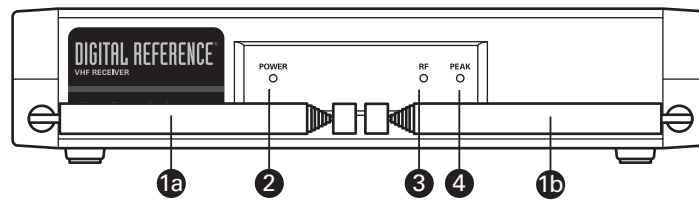
AT8114	Foam windscreen for handheld transmitter.
AT8390	Premium instrument cable with 1/4" to 1/4" phone plugs. Available in a variety of lengths.
AT8456a	Quiet-Flex™ microphone stand clamp for handheld transmitter, 5/8"-27 threads.
AT8634	Rack-mount adapter kit mounts one ATW-R250 in a single 19" rack space.
ATW-VP10	Vinyl UniPak™ pouch with belt clip to hold UniPak™ transmitter.

## Antennas

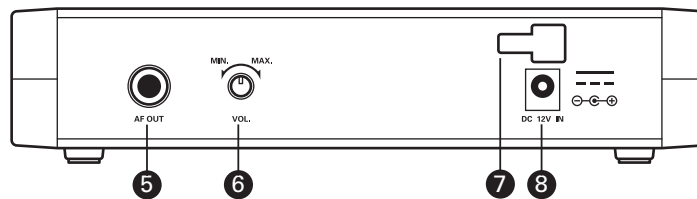


**Figure A** (p. 3)

## Receiver Controls and Functions



**Figure B** - Front panel controls and functions



**Figure C** - Rear panel controls and functions



## Transmitter Controls and Functions

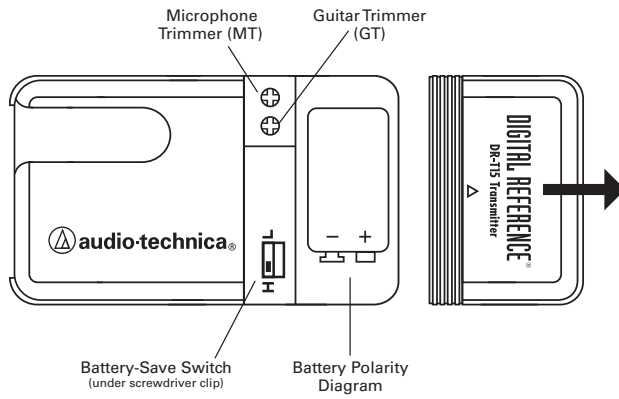


Figure D

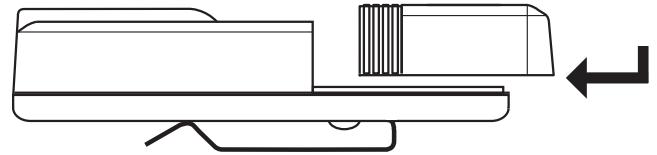


Figure E

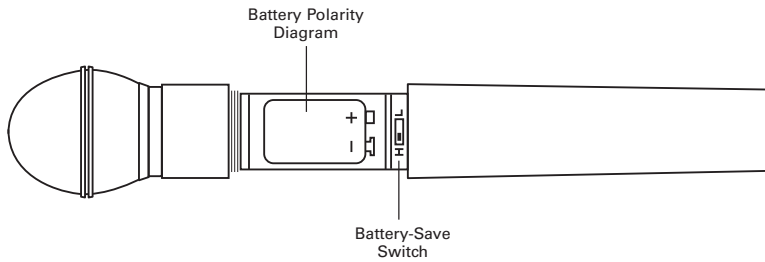


Figure F

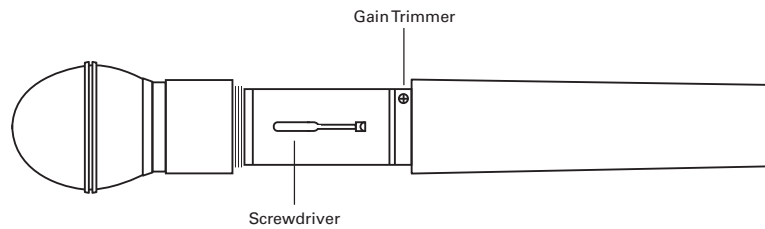


Figure G

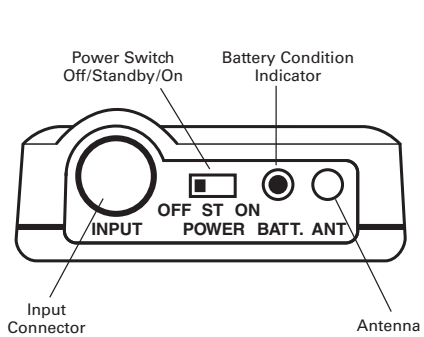


Figure H

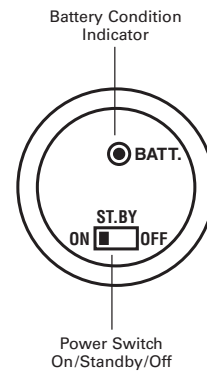


Figure I

### **Two (2) Year Limited Warranty on Wireless System Components**

Digital Reference® brand wireless system components (receivers, transmitters, microphones, cables) made by Audio-Technica, purchased in the U.S.A., are warranted for two years from the date of purchase by Audio-Technica U.S., Inc. (A.T.U.S.) to be free of defects in materials and workmanship, including implied warranties of merchantability or fitness for a particular purpose, subject to normal use and service, for two (2) years to the original owner from the date of purchase. In event of such defect, product will be repaired promptly without charge or, at our option, replaced with a new product of equal or superior value if delivered to A.T.U.S. or an Authorized Service Center, prepaid, together with the sales slip or other proof of purchase date. Prior approval from A.T.U.S. is required for return. This warranty excludes defects due to normal wear, abuse, shipping damage, or failure to use product in accordance to instructions. This warranty is void in the event of unauthorized repair or modification, or removal or defacing of the product labeling.

Except to the extent precluded by applicable state law, A.T.U.S. will have no liability for any consequential, incidental, or special damages; any warranty of merchantability or fitness for a particular purpose expires when this warranty expires.

Retailer and manufacturer shall not be liable for damages based upon inconvenience, loss of use of product, loss of time, interrupted operation or commercial loss or any other incidental or consequential damages including but not limited to lost profits, downtime, goodwill, damage to or replacement of equipment and property, and any costs of recovering, reprogramming, or reproducing any program or data stored in equipment that is used with Digital Reference® products. This guarantee gives you specific legal rights: you may have other legal rights which vary from state to state. Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

For return approval and shipping information, contact the Service Department:

Audio-Technica U.S., Inc.  
1221 Commerce Drive  
Stow, Ohio 44224

Outside the U.S.A., please contact your local dealer for warranty details.

### **Consumer Alert**

Most users do not need a license to operate this wireless microphone system. Nevertheless, operating this microphone system without a license is subject to certain restrictions: the system may not cause harmful interference; it must operate at a low power level (not in excess of 50 milliwatts); and it has no protection from interference received from any other device. Purchasers should also be aware that the FCC is currently evaluating use of wireless microphone systems, and these rules are subject to change. For more information, call the FCC at 1-888- CALL-FCC (TTY: 1-888-TELL-FCC) or visit the FCC's wireless microphone website at [www.fcc.gov/cgb/wirelessmicrophones](http://www.fcc.gov/cgb/wirelessmicrophones)



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